GRADE 12 DIPLOMA EXAMINATION

Biology 30

June 1986

Alberta
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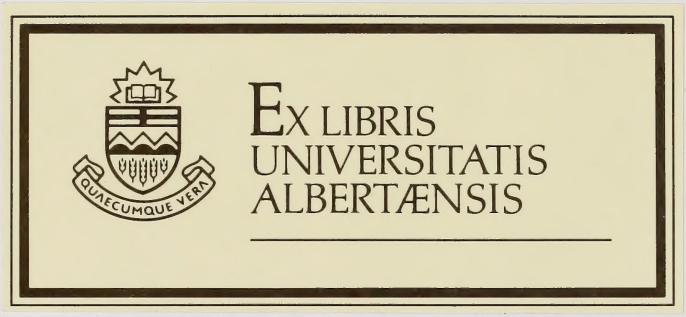

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BIOLOGY 30 MULTIPLE-CHOICE KEY

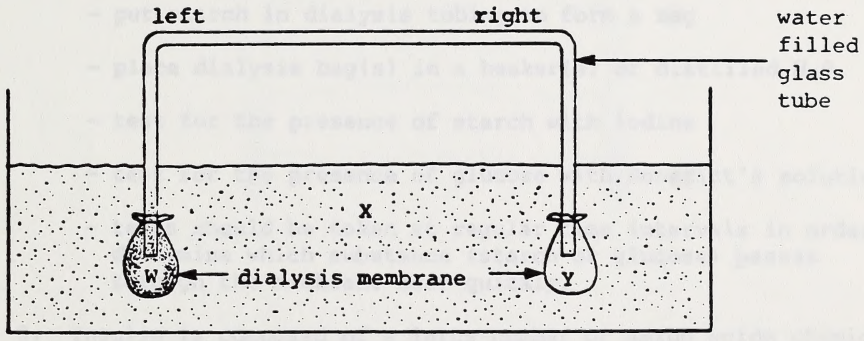
1.	A	41.	A
2.	B	42.	B
3.	A	43.	C
4.	A	44.	C
5.	C	45.	B
6.	D	46.	C
7.	A	47.	D
8.	A	48.	B
9.	D	49.	D
10.	D	50.	D
11.	C	51.	B
12.	C	52.	B
13.	C	53.	C
14.	B	54.	B
15.	D	55.	B
16.	A	56.	B
17.	D	57.	D
18.	D	58.	A
19.	C	59.	C
20.	D	60.	D
21.	A	61.	B
22.	B	62.	C
23.	C	63.	D
24.	C	64.	B
25.	A	65.	B
26.	D	66.	C
27.	A	67.	A
28.	C	68.	A
29.	C	69.	C
30.	B	70.	B
31.	B	71.	D
32.	C	72.	D
33.	A	73.	C
34.	C	74.	B
35.	A	75.	D
36.	C	76.	C
37.	C	77.	B
38.	D	78.	D
39.	B	79.	B
40.	B	80.	B

SAMPLE ANSWERS TO THE WRITTEN-RESPONSE SECTION

Note: The responses that follow represent ONE approach to each of the problems. During the diploma examination marking session, provision is made for considering the various approaches students may have used.

Use the following information to answer question 1.

An Osmotic System



W represents a 6% glucose solution
X represents a 3% glucose solution
Y represents a 1% glucose solution

Note: the membranes at W and Y are impermeable to glucose.

(1 mark) 1. a. Initially, in which direction would the solution in the tube move?

- from left to right

(2 marks) b. Explain your answer.

- the net movement of water is from X to W because W has a greater concentration of glucose

- the net movement of water is from Y to X because X has a greater concentration of glucose

(6 marks) 2. Using materials from the list below, design a PROCEDURE for a demonstration to show which substance (starch or glucose) passes more quickly through a semipermeable membrane. Assume that any other necessary lab equipment is available.

Materials:

1% glucose solution	Benedict's solution
1% starch suspension	iodine solution
dialysis tubing (semipermeable membrane)	distilled water

- put glucose in dialysis tubing to form a bag
- put starch in dialysis tubing to form a bag
- place dialysis bag(s) in a beaker(s) of distilled H_2O.
- test for the presence of starch with iodine
- test for the presence of glucose with Benedict's solution.
- tests should be taken at regular time intervals in order to determine which substance (starch or glucose) passes through the membrane most quickly.

(2 marks) 3. Insulin is composed of a large number of amino acids chemically bonded together. Given this information, why must a diabetic inject insulin rather than take it orally?

- insulin is a protein
- the protein would be digested

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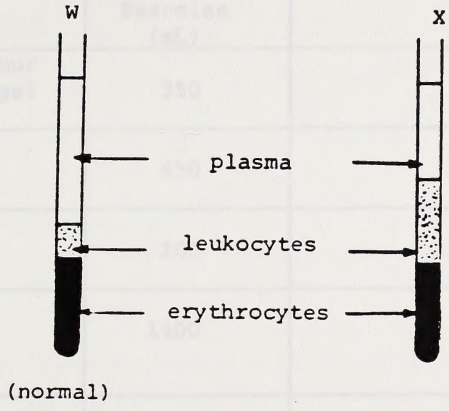
Use the following information to answer question 4.

When blood from subjects W and X is mixed with an anticoagulant and centrifuged, it separates into erythrocytes, leukocytes, and plasma components. The diagram below represents blood samples taken from the two subjects living at sea level.



(2 marks) 4. a. Compare the differences in cellular composition of the two blood samples from W and X and give a plausible interpretation for the blood composition of subject X.

- subject X has a greater volume of leukocytes
- subject X may have an infection

(2 marks) b. Hemoglobin has a much greater affinity for carbon monoxide than for oxygen. If subject W were exposed to low levels of carbon monoxide for one month, what change would you expect to find in a blood sample taken at the end of this period? Explain your answer.

- increased volume of erythrocytes
- due to reduced O_2 levels in the blood

Use the following information to answer question 5.

Daily Water Loss in Humans		
Medium	Water Loss Without Exercise (mL)	Water Loss With Exercise (mL)
Water Vapour (from lungs)	350	850
Sweat	450	2900
Feces	200	200
Urine	1400	500
TOTAL	2400	4450

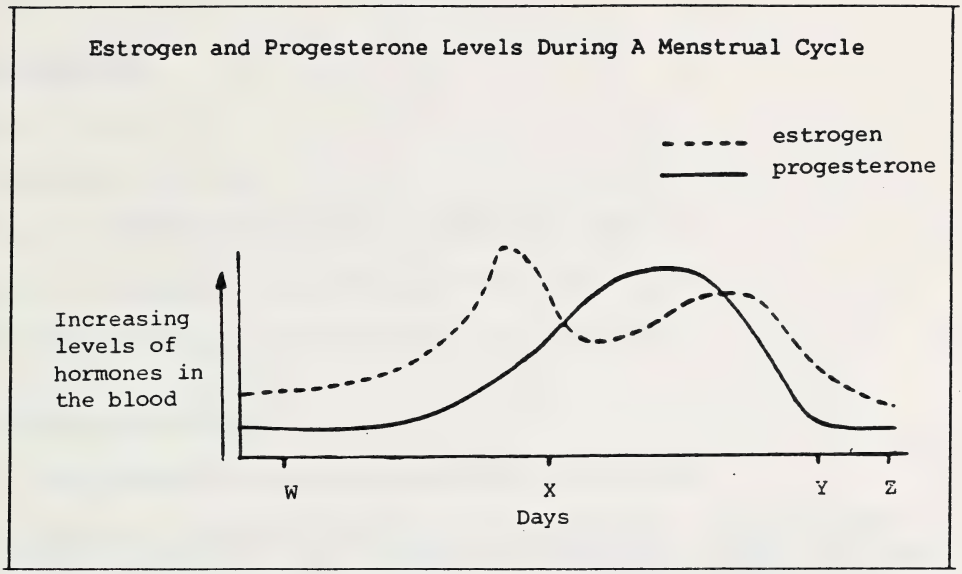
(2 marks) 5. a. In reference to the data, explain why there is increased water loss through the lungs and skin during prolonged exercise.

- breathing (rate and depth) increases during exercise which results in increased water loss through the lungs
- to cool the body by means of increased perspiration

(1 mark) b. Indicate why daily urine output decreases during a period of heavy exercise.

- to compensate for the high loss of water.

Use the following information to answer question 6.



(1 mark) 6. a. By which day (W, X, Y or Z) would you expect to find a functioning corpus luteum?

- X

(1 mark) b. Explain your answer.

- an increasing progesterone level indicates that the corpus luteum is functioning

GRADE 12 DIPLOMA EXAMINATION
BIOLOGY 30

DESCRIPTION

Time: 2½ hours

Total possible marks: 100

This is a **CLOSED-BOOK** examination consisting of two parts:

PART A: 80 multiple-choice questions each with a value of 1 mark.

PART B: Six written-response questions for a total of 20 marks.

GENERAL INSTRUCTIONS

Fill in the information on the answer sheet as directed by the examiner.

For multiple-choice questions, read each carefully and decide which of the choices BEST completes the statement or answers the question. Locate that question number on the answer sheet and fill in the space that corresponds to your choice. USE AN HB PENCIL ONLY.

Example

This examination is for the subject area of

A. Chemistry
B. Biology
C. Physics
D. Mathematics

Answer Sheet

A	B	C	D
①	●	③	④

If you wish to change an answer, please erase your first mark completely.

For written-response questions, read each carefully, show all your calculations, and write your answer in the space provided in the examination booklet.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET

The presiding examiner will collect the answer sheet and examination booklet for transmission to Alberta Education.

JUNE 1986

PART A

INSTRUCTIONS

There are 80 multiple-choice questions with a value of one mark each in this section of the examination. Use the separate answer sheet provided and follow the specific instructions given.

NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

WHEN YOU HAVE COMPLETED PART A, PROCEED DIRECTLY TO PART B

DO NOT TURN THE PAGE TO START THE EXAMINATION UNTIL TOLD TO DO SO BY THE PRESIDING EXAMINER.

1. Mitochondria utilize large amounts of

   A. oxygen
   B. nitrogen
   C. lactic acid
   D. carbon dioxide

2. The organelles responsible for protein synthesis are the

   A. lysosomes
   B. ribosomes
   C. mitochondria
   D. Golgi bodies

3. A mutant strain of cells has abnormal mitochondria. The resulting deficiency in these cells would directly affect

   A. energy production
   B. alveolar gas exchange
   C. intracellular transport
   D. osmosis within blood capillaries

4. The greatest part of the mass of a living cell is made up of

   A. water
   B. proteins
   C. carbohydrates
   D. organic molecules

5. In which activity would the human body NOT utilize ATP?

   A. Digestion
   B. Synthesis of hormones
   C. Diffusion of water from interstitial fluid to capillaries
   D. Movement of glucose molecules out of nephrons into interstitial fluid

Use the following information to answer question 6.

Red Blood Cells in Various Solutions

1 2 3 4

Note: Arrows indicate the movement of water in and out of red blood cells. The large arrows indicate a large volume of water, while the small arrows indicate a small volume of water.

6. If a red blood cell is placed in a concentrated salt solution, which of the above situations is likely to occur?

A. 1
B. 2
C. 3
D. 4

Use the following information to answer question 7.

Natural rubber is permeable to carbon dioxide, but impermeable to oxygen, nitrogen, and water vapor. Three natural rubber balloons were filled with equal volumes of gases. Balloon 1 was filled with CO_2, balloon 2 was filled with O_2, and balloon 3 was filled with exhaled breath. The balloons were released into a chamber filled with air and kept at a constant temperature and pressure.

7. What would be observed after two days?

A. Balloon 1 will have deflated more than balloon 3.
B. Balloon 3 will have deflated more than balloon 1.
C. Balloon 1 will have deflated as much as balloon 2.
D. Balloon 2 will have deflated as much as balloon 3.

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8. Enzymes are always

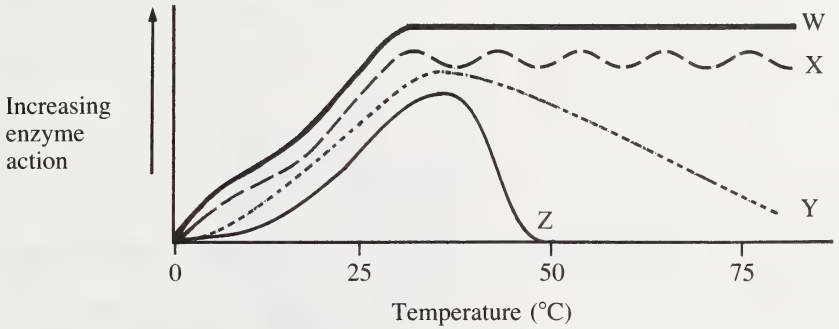
A. proteins
B. vitamins
C. phosphates
D. nucleic acids

9. Many insecticides interfere with metabolic reactions through the process of

A. exocytosis
B. endocytosis
C. active transport
D. competitive inhibition

Use the following information to answer question 10.

Lines W, X, Y and Z illustrate possible relationships between temperature and the rate of a reaction catalyzed by an enzyme.



10. In humans, the best illustration of the relationship is

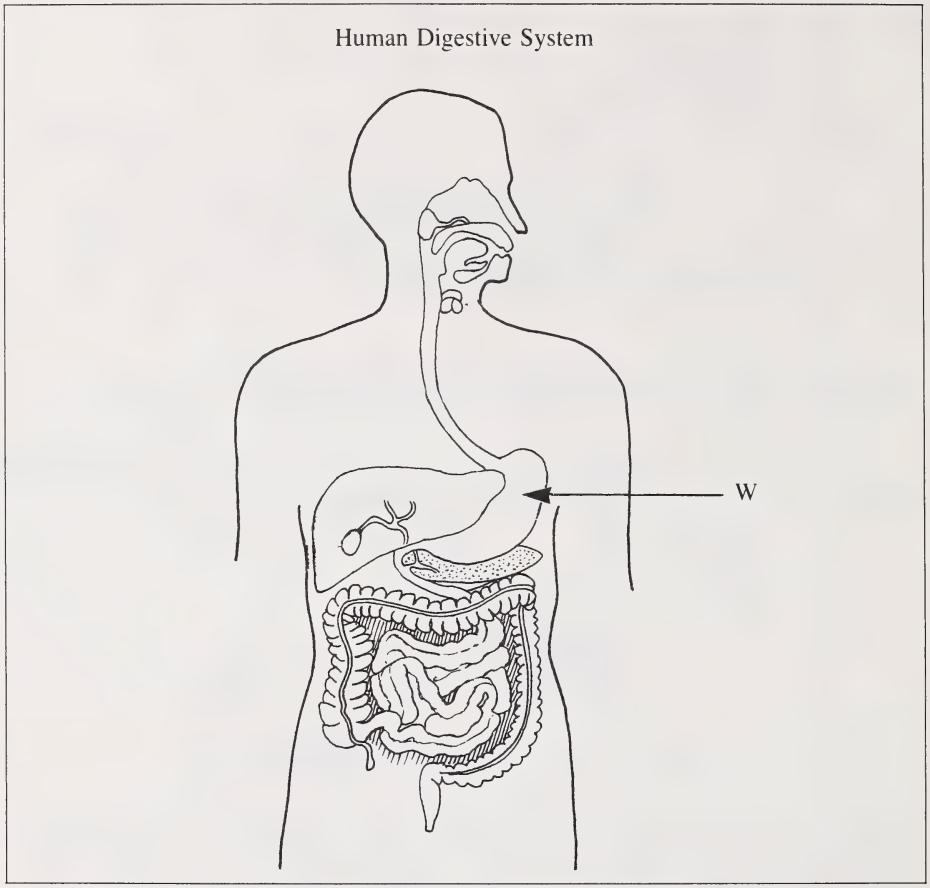
A. W
B. X
C. Y
D. Z

---

11. Nitrogen is a component of which nutrients?

A. Lipids and carbohydrates
B. Proteins and carbohydrates
C. Proteins and nucleic acids
D. Carbohydrates and nucleic acids

Use the following information to answer question 12.



12. The fluid produced in the organ labelled W would be

A. bile
B. insulin
C. gastric juice
D. pancreatic juice

Use the following information to answer question 13.

During an experiment, tests were performed on four foods to detect the presence of sugar, protein, starch, and lipid.

Test Tube	Food
1	butter
2	egg white
3	candy bar
4	potato

In one test, a substance was added to each test tube and then all test tubes were placed in a hot water bath. After 1 minute the contents of one of the test tubes had changed from a blue color to a reddish-orange color.

13. In which test tube did this color change occur?

A. 1
B. 2
C. 3
D. 4

---

14. The stomach contains enzymes which catalyze the chemical breakdown of

A. proteins under basic conditions
B. proteins under acidic conditions
C. carbohydrates under basic conditions
D. carbohydrates under acidic conditions

15. The function of the villi is to

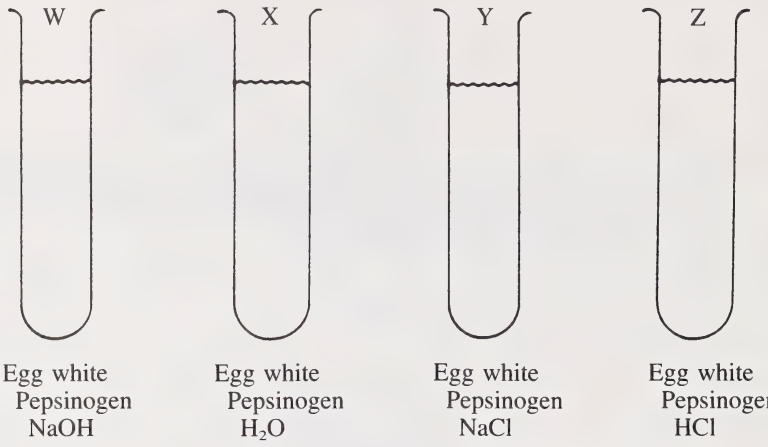
A. destroy bacteria
B. regulate digestion
C. move food along the intestine
D. increase the surface area of the small intestine

16. A person with a diseased gall bladder may experience difficulty

A. digesting fat
B. producing bile
C. storing glycogen
D. deaminating amino acids

Use the following information to answer question 17.

Equal amounts of egg white solution in four test tubes are incubated at 37°C for 45 minutes and then tested for degree of digestion.



17. The contents of the test tube that would indicate the greatest degree of digestion is

A. W
B. X
C. Y
D. Z

---

18. The organ which converts fatty acids into sugar is the

A. small intestine
B. pancreas
C. stomach
D. liver

19. Secretin plays an important role as one of the regulators of pH within the digestive system. The chief function of secretin is to stimulate the

A. liver to produce digestive enzymes
B. stomach to produce hydrochloric acid
C. pancreas to produce sodium bicarbonate
D. small intestine to produce digestive enzymes

20. An adult whose stomach fails to secrete hydrochloric acid will have difficulty in the initial digestion of

A. lipids
B. sugars
C. starches
D. proteins

21. The liberation of the contents of the gall bladder into the small intestine is required for the digestion of

A. fats
B. sugars
C. proteins
D. vitamins

22. Blood in the feces may indicate

A. damage to the nephric tubules
B. ulceration of the lining of the large intestine
C. excess absorption of proteins into the blood
D. destruction of the bone marrow by heavy metals

23. Before a disaccharide such as table sugar can be used in the human body, it must be converted to

A. two glycogen molecules
B. two disaccharide molecules
C. two monosaccharide molecules
D. one monosaccharide and one disaccharide molecule

24. The one-way flow of blood in the veins is assisted by BOTH

A. hormones and blood pressure
B. nervous control and endocrine control
C. valves and skeletal muscle contraction
D. blood pressure and the effects of acetylcholine

25. One laboratory procedure used to identify anemia, a disorder characterized by a lack of energy due to oxygen deficiency, is to take a

A. red blood cell count
B. blood pressure reading
C. white blood cell count
D. urine protein level measurement

26. Blood leaving the vena cava would proceed through the circulatory system in which order?

A. Left ventricle, left atrium, lung capillaries, right ventricle, right atrium
B. Right ventricle, right atrium, lung capillaries, left ventricle, left atrium
C. Left atrium, left ventricle, lung capillaries, right atrium, right ventricle
D. Right atrium, right ventricle, lung capillaries, left atrium, left ventricle

27. A function of the lymphatic system is to

A. return fluid to the blood
B. remove undigested wastes
C. return erythrocytes to the blood
D. produce erythrocytes and platelets

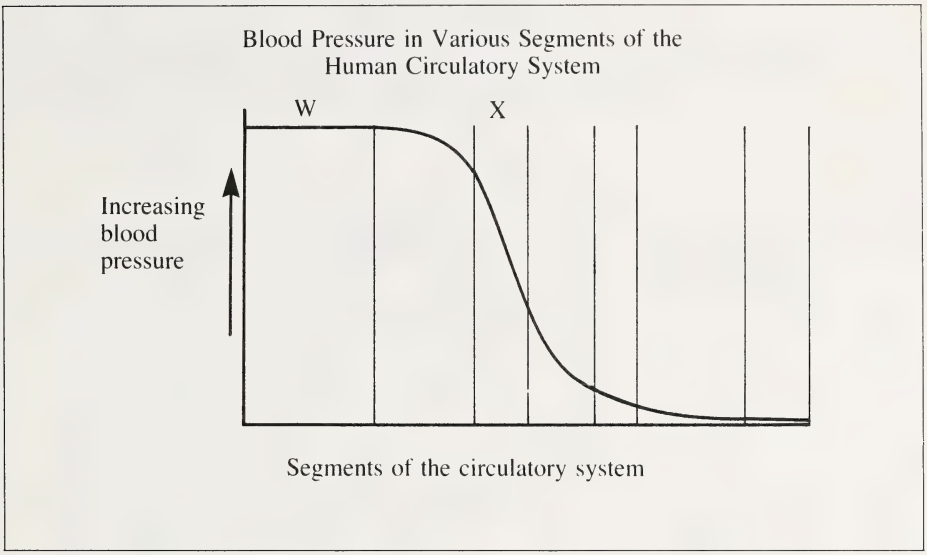
28. The chamber of the heart that has the thickest wall is the

A. left atrium
B. right atrium
C. left ventricle
D. right ventricle

29. The pulse of blood that can be felt in the wrist and other parts of the body is the result of the

A. action of arterial valves
B. rhythmic functioning of valves in the veins
C. stretching and subsequent contracting of arterial walls
D. force of the contracting right ventricle transmitted through the blood

Use the following information to answer question 30.



30. If graph segment W represents the pressure in the aorta, then graph segment X represents the pressure in

A. large veins
B. arterioles
C. arteries
D. venules

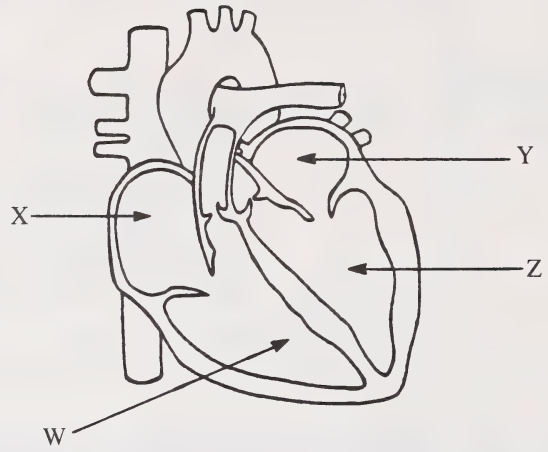
---

31. The heart ventricles begin to fill when

A. atrial pressure is lower than ventricular pressure and the atrioventricular (AV) valves are pushed open
B. ventricular pressure is lower than atrial pressure and the atrioventricular (AV) valves are pushed open
C. ventricular pressure is lower than atrial pressure and the atrioventricular (AV) valves are pushed shut
D. atrial pressure is lower than ventricular pressure and the atrioventricular (AV) valves are pushed shut

Use the following information to answer question 32.

Ventral View of the Human Heart



32. The chamber of the heart that receives blood directly from the pulmonary veins is

A. W
B. X
C. Y
D. Z

---

33. When blood pressure exceeds the osmotic pressure in the capillaries, the net movement of H_2O is

A. into the tissues
B. into the capillaries
C. unchanged because of the relatively impermeable capillary wall
D. unchanged because of the immediate increase in osmotic pressure

34. Four individuals, W, X, Y and Z, were interested in their blood types. Individual Z knew that she was of type O. The blood type of one of the other individuals could be definitely determined when

A. Z's serum clumped the red blood cells in a sample of X's blood
B. X's serum clumped the red blood cells in a sample of Y's blood
C. Z's serum did not clump the red blood cells in a sample of W's blood
D. X's serum did not clump the red blood cells in a sample of W's blood

Use the following information to answer question 35.

Skin capillaries were observed microscopically. Each of 10 capillaries was subjected to the series of treatments outlined below. Each capillary was allowed to recover from the effects of one treatment before being subjected to the next.

	Treatment	Average flow of blood cells/minute
I	none (normal)	600
II	adrenalin added	400
III	alcohol added	800
IV	lactic acid added	900
V	temperature reduced	300

35. Treatment II was repeated using a slightly higher concentration of adrenalin. With reference to the original treatment of adrenalin, the increased concentration of adrenalin would probably

A. cause a decrease in the blood cell flow
B. cause an increase in the blood cell flow
C. result in a change comparable to Treatment IV
D. result in a change comparable to Treatment III

---

36. In airline emergencies at high altitudes, oxygen masks are used by passengers. Why is a small amount of carbon dioxide added to the oxygen?

A. Carbon dioxide is necessary to reduce the hemoglobin.
B. Pure oxygen cannot be absorbed by the lungs unless diluted.
C. Carbon dioxide stimulates the respiratory centre in the brain.
D. Pure oxygen causes the formation of nitrogen bubbles in the blood.

37. The function of the alveoli of the lungs is to

A. filter harmful bacteria out of the air
B. actively transport oxygen into the capillaries
C. provide a large surface area for gas exchange
D. provide a surface for cellular respiration to occur

38. A person starts a two-year training program in an attempt to become a marathon runner. It would be reasonable to predict that at the end of the two-year training period the person at rest would have a

A. faster breathing rate and a faster heart rate
B. slower breathing rate but a faster heart rate
C. faster breathing rate but a slower heart rate
D. slower breathing rate and a slower heart rate

39. Emphysema is characterized by the destruction of some of the alveolar walls in the lungs. Which statement describes a person suffering from emphysema?

A. A decreased alveolar surface area and a decreased CO_2 content of the blood
B. A decreased alveolar surface area and an increased CO_2 content of the blood
C. An increased alveolar surface area and a decreased CO_2 content of the blood
D. An increased alveolar surface area and an increased CO_2 content of the blood

40. When a mountain climber ascends to about 3700 m, he may experience headaches and nausea. After a month at high altitudes, these effects wear off because

A. he has now adapted to use less oxygen
B. the number of red blood cells has increased
C. carbon dioxide begins to diffuse faster from the lungs
D. the alveolar surface area has increased to receive more oxygen

41. A high carbon dioxide level in the blood would decrease the pH of the blood by forming carbonic acid. This low pH is avoided because

A. H^+ combines with hemoglobin
B. H^+ forms from bicarbonate ions
C. enzymes prevent excess H^+ formation
D. oxyhemoglobin can raise the pH of the blood

42. Electrons are transferred from weak to stronger acceptors. An example of an electron acceptor is

A. ATP
B. oxygen
C. glucose
D. lactic acid

43. To maintain constant internal body temperature under low external temperatures, the type of tissue that produces heat is

A. fat
B. blood
C. muscle
D. epithelial

44. If cellular respiration stopped, which activity would be affected first?

A. Osmosis
B. Diffusion
C. Active transport
D. Molecular motion

45. After a period of strenuous exercise is over, the breathing rate continues at a higher level for a number of minutes because more oxygen is required to

A. lower the pH in muscle and blood tissue
B. metabolize lactic acid and restore ATP levels
C. reduce creatine phosphate in muscle tissue to normal levels
D. neutralize carbon dioxide levels in the blood and muscle tissue

46. Amino acids move from the glomerulus to Bowman's capsule because of

A. diffusion
B. endocytosis
C. blood pressure
D. active transport

47. Blood enters the kidney through the

A. aorta
B. vena cava
C. renal vein
D. renal artery

48. Production of urea results primarily from the metabolism of

A. fats
B. amino acids
C. nucleic acids
D. carbohydrates

49. Between the proximal tubule and the loop of Henle the change in glucose concentration is due to

A. osmosis
B. filtration
C. exocytosis
D. reabsorption

50. The correct sequence of structures through which a molecule of urea would pass is

A. Bowman's capsule → glomerulus → tubules and loop of Henle → ureter → collecting duct → bladder → urethra
B. glomerulus → Bowman's capsule → tubules and loop of Henle → collecting duct → urethra → bladder → ureter
C. Bowman's capsule → glomerulus → tubules and loop of Henle → collecting duct → ureter → bladder → urethra
D. glomerulus → Bowman's capsule → tubules and loop of Henle → collecting duct → ureter → bladder → urethra

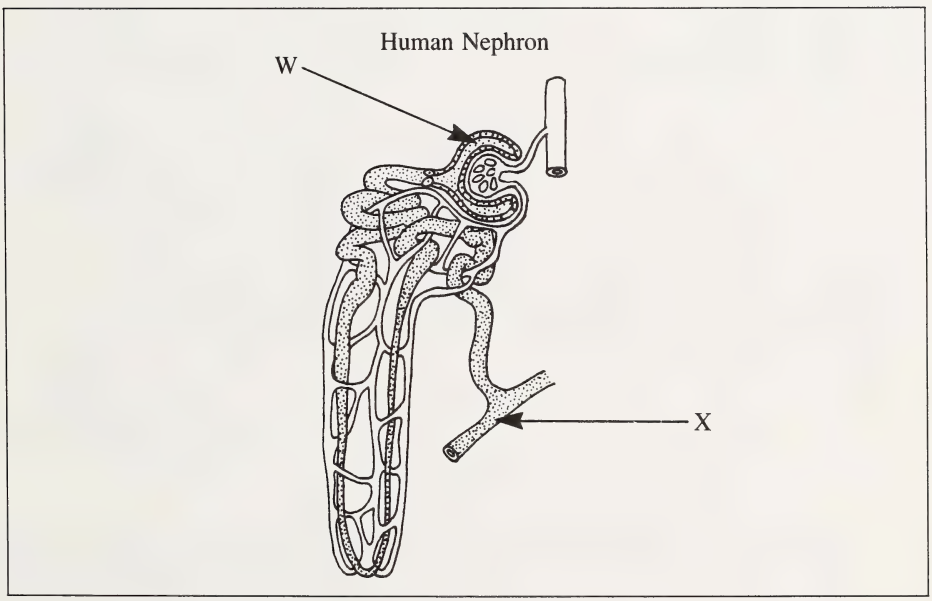
51. Which statement best expresses the relationship between ADH levels in the blood and the formation of concentrated or dilute urine?

A. Low levels of ADH result in the production of concentrated urine.
B. High levels of ADH result in the production of concentrated urine.
C. Low levels of ADH result in greater reabsorption of water by the blood.
D. High levels of ADH result in greater reabsorption of salt by distal tubules.

52. Diabetes insipidus is a disease that results in an excessive volume of highly dilute urine. This is probably due to

A. low TSH levels
B. low ADH levels
C. high TSH levels
D. high ADH levels

Use the following information to answer question 53.



53. If the concentration of a substance is 0.01 g/L in the structure labelled W and 0.10 g/L in the structure labelled X, then the substance is probably

A. retained in the blood
B. reabsorbed by tubule cells
C. not reabsorbed by tubule cells
D. returned to the circulatory system

54. Nervous system function is supplemented by the actions of the

A. excretory system
B. endocrine system
C. respiratory system
D. circulatory system

55. The presence of adrenalin in the blood would result in

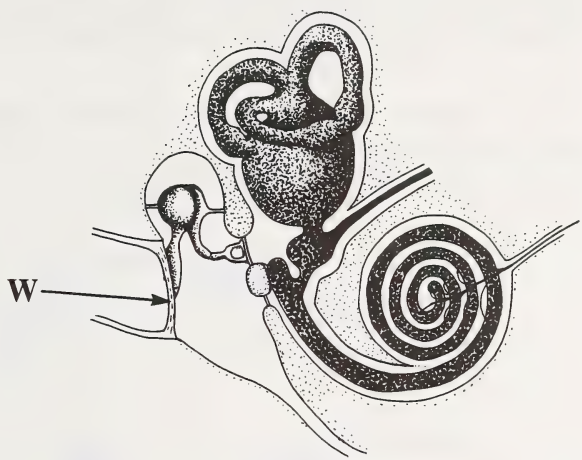
A. increased blood flow to digestive organs
B. increased blood flow to skeletal muscles
C. a decrease in the conversion rate of glycogen to glucose
D. a decrease in heart rate and strength of heart contraction

56. A color-blind person's eyes would have defective

A. rods
B. cones
C. foveas
D. optic nerves

Use the following information to answer question 57.

The Human Ear



57. The structure labelled W represents the

A. utricle
B. cochlea
C. ossicles
D. ear drum

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58. Nervous co-ordination differs from hormonal co-ordination because nervous co-ordination is

A. faster
B. slower
C. less specific
D. controlled by hormones

59. Cholinesterase, which is released at the synapse, is inactivated by a poison. This poisoning will result in

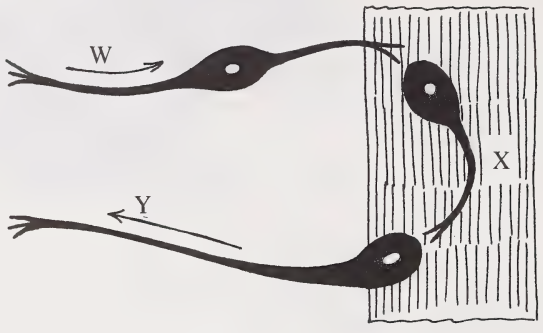
A. increased permeability of the dendrite
B. decreased permeability of the dendrite
C. continued action of the transmitter substance
D. complete inactivation of the transmitter substance

60. The autonomic nervous system has minimal, if any, control of

A. dilation of the pupils to read this statement
B. decreased intestinal peristalsis due to stress
C. exam tension causing increased gastric secretion
D. muscular co-ordination required to write this exam

Use the following information to answer question 61.

A Neural Pathway



61. Which label in the diagram identifies a sensory neuron or neurons?

A. Y only
B. W only
C. Y and X
D. W and X

---

62. The process involved in changing the shape of the lens while viewing objects at varying distances is

A. adaptation
B. astigmatism
C. accommodation
D. depth perception

63. A body response that can be attributed to the action of thyroxin is

A. increased heart rate after an accident
B. increased blood glucose after exercise
C. decreased skin blood supply during bleeding
D. increased body heat production in cold weather

64. The refractory period of a neuron was found to be 0.001 seconds. The neuron was stimulated at the threshold level and 0.0002 seconds later it was again stimulated at the threshold level. The second stimulus would

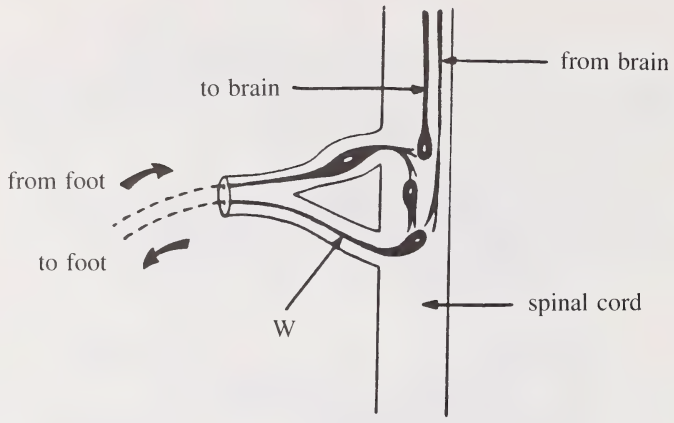
A. produce an impulse in the neuron
B. not produce an impulse in the neuron
C. cause the speed of the impulse to slow down
D. cause the neuron to take a longer period to recover

65. The pathway for the transmission of sound in the ear is

A. tympanic membrane, oval window, ossicles, cochlea, hair cells, auditory nerve
B. auditory canal, tympanic membrane, ossicles, oval window, hair cells, auditory nerve
C. tympanic membrane, Eustachian tube, ossicles, cochlea, oval window, hair cells, auditory nerve
D. auditory canal, Eustachian tube, tympanic membrane, ossicles, oval window, hair cells, auditory nerve

Use the following information to answer question 66.

Motor and Sensory Pathways From Foot to Brain



A barefoot person by a campfire accidentally steps on a hot coal and then feels the sharp pain of the burn.

66. If there had been a blockage at point W prior to the accident, the person would have felt

A. pain and could have moved his foot
B. no pain and could have moved his foot
C. pain and would not have been able to move his foot
D. no pain and would not have been able to move his foot

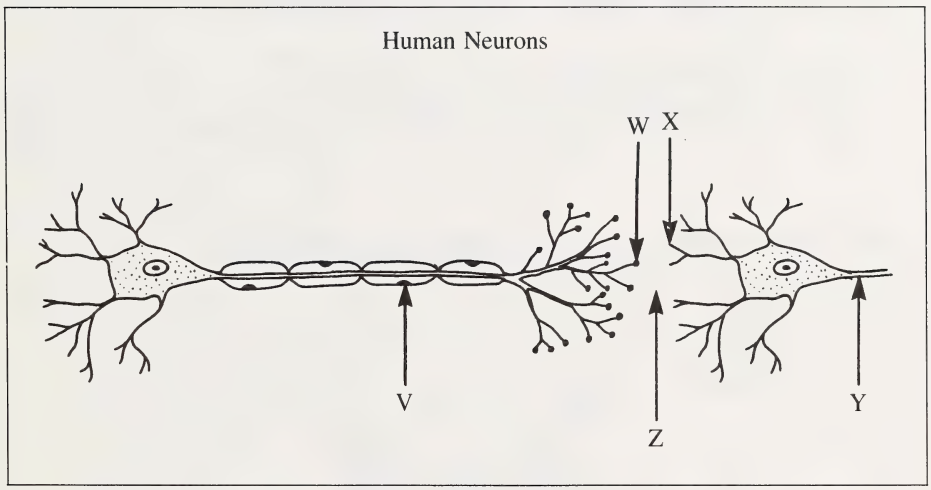
67. If temperature receptors in the hypothalamus sense that the blood is too warm

A. skin arterioles dilate
B. skin arterioles constrict
C. the pancreas increases the secretion of glucagon
D. the thyroid gland increases the rate of metabolism

68. The effects of the sympathetic nervous system are similar to those of

A. adrenalin
B. conditioning
C. acetylcholine
D. accommodation

Use the following information to answer question 69.



69. During an experiment it was found that an impulse travelled from V to W but not from W to Y. Which of the following is a likely reason to explain the non-transmission from W to Y?

A. There is an excess of acetylcholine at Z.
B. A drug may be inhibiting cholinesterase at Z.
C. The depolarization mechanism is non-functional at X.
D. A drug may be stimulating the action of a neurotransmitter at W.

70. Myofibrils are made up of protein filaments consisting of

A. actin and myelin
B. myosin and actin
C. ATP and rhodopsin
D. myosin and collagen

71. When a muscle becomes fatigued, there is

A. no glycogen, little lactic acid, and much ATP in the muscle
B. little lactic acid, little ATP, and much glycogen in the muscle
C. much lactic acid, much ATP, and much glycogen in the muscle
D. little or no ATP, little glycogen, and much lactic acid in the muscle

72. During muscle contraction, creatine phosphate functions by

A. acting in place of ATP in muscle fibre contraction
B. hydrolyzing glycogen to begin cellular respiration
C. adding phosphate to glucose to begin fermentation
D. providing high energy phosphate for the synthesis of ATP

73. The thickening of the uterine wall is caused mainly by

A. LH
B. FSH
C. estrogen
D. oxytocin

74. An ovum develops within

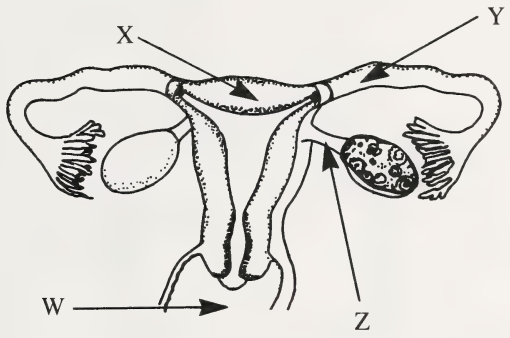
A. an ovary that is within a follicle
B. a follicle that is within an ovary
C. a corpus luteum that is within an ovary
D. a corpus luteum that is within a follicle

75. If the supply of testosterone in a normal human male were stopped, one would expect an INCREASE in the secretion of

A. relaxin
B. adrenalin
C. aldosterone
D. gonadotropic hormone

Use the following information to answer question 76.

The Female Reproductive System

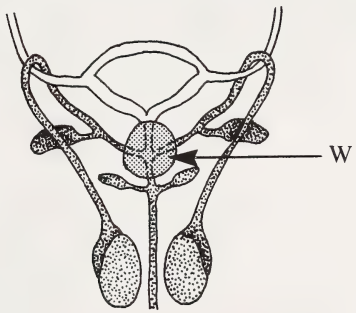


76. The structure through which eggs pass from ovary to uterus is labelled

A. W
B. X
C. Y
D. Z

Use the following information to answer question 77.

The Male Urogenital System

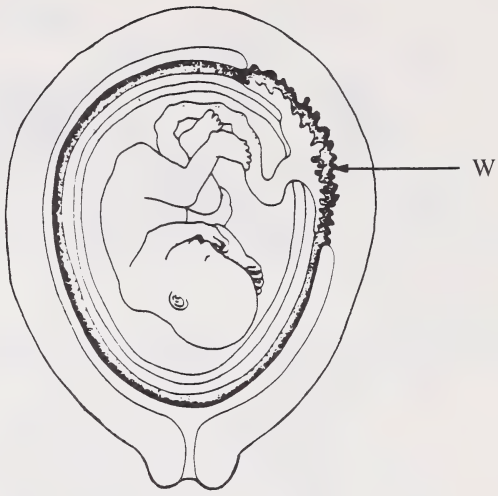


77. The structure labelled W is the

A. bladder
B. prostate gland
C. seminal vesicle
D. Cowper's gland

Use the following information to answer question 78.

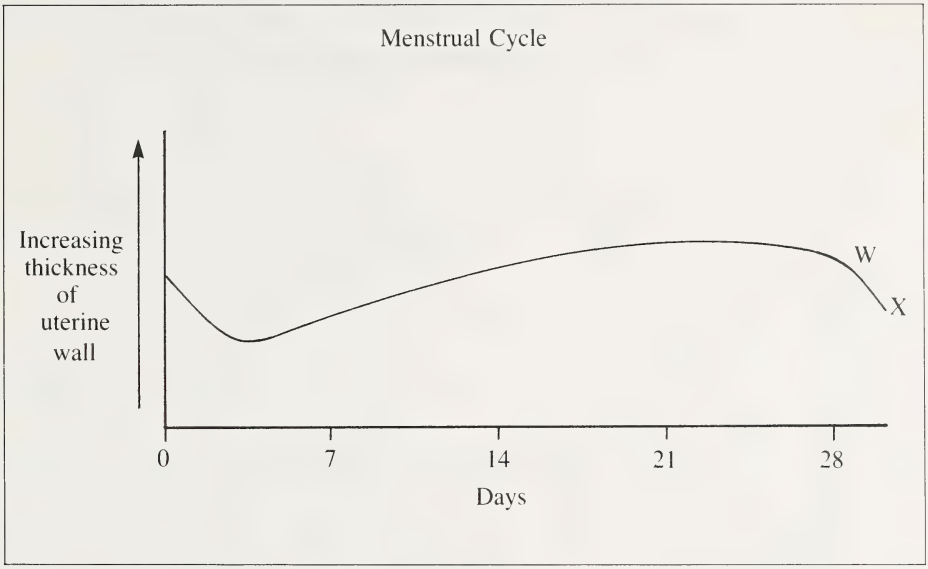
Human Fetus



78. The structure labelled W functions to

A. form blood cells
B. produce amniotic fluid
C. produce food for the fetus
D. exchange nutrients and wastes

Use the following information to answer question 79.

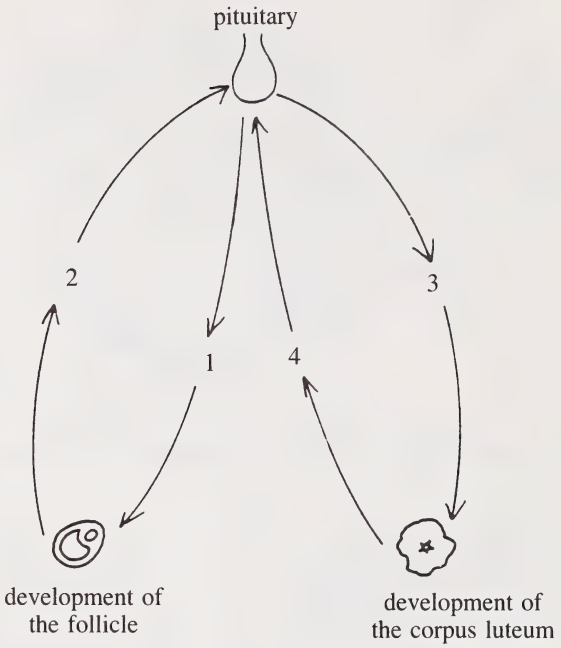


79. In the graph, the curve from W to X represents what happens in the menstrual cycle when

A. estrogen increases
B. progesterone decreases
C. the uterine lining thickens
D. the corpus luteum secretes LH

Use the following information to answer question 80.

A Hormonal Feedback System



80. The hormone represented by number 1 is

A. LH
B. FSH
C. estrogen
D. progesterone

YOU HAVE NOW COMPLETED THE MULTIPLE-CHOICE SECTION OF THE EXAMINATION. PLEASE PROCEED TO THE NEXT PAGE AND ANSWER THE WRITTEN-RESPONSE QUESTIONS IN PART B.

PART B

INSTRUCTIONS

Please write your answers in the examination booklet as neatly as possible.

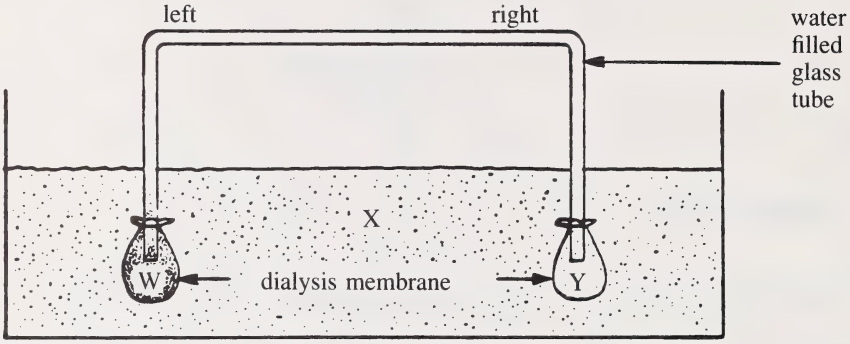
NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work.

TOTAL MARKS: 20

START PART B IMMEDIATELY

Use the following information to answer question 1.

An Osmotic System



W represents a 6% glucose solution
X represents a 3% glucose solution
Y represents a 1% glucose solution

Note: the membranes at W and Y are impermeable to glucose.

(1 mark) 1. a. Initially, in which direction would the solution in the tube move?

_____

_____

(2 marks) **b.** Explain your answer.

_____

_____

_____

_____

_____

(6 marks) 2. Using materials from the list below, design a PROCEDURE for a demonstration to show which substance (starch or glucose) passes more quickly through a semipermeable membrane. Assume that any other necessary lab equipment is available.

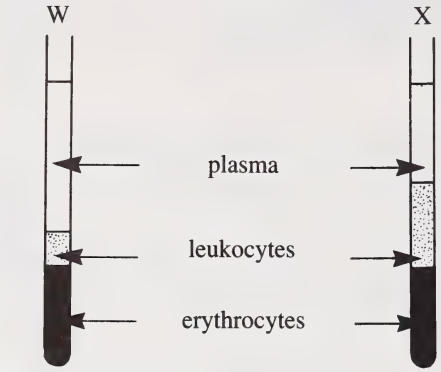
Materials:

1% glucose solution
1% starch suspension
dialysis tubing (semipermeable membrane)
Benedict's solution
iodine solution
distilled water

(2 marks) 3. Insulin is composed of a large number of amino acids chemically bonded together. Given this information, why must a diabetic inject insulin rather than take it orally?

Use the following information to answer question 4.

When blood from subjects W and X is mixed with an anticoagulant and centrifuged, it separates into erythrocytes, leukocytes, and plasma components. The diagram below represents blood samples taken from the two subjects living at sea level.



(normal)

(2 marks) 4. a. Compare the differences in cellular composition of the two blood samples from W and X and give a plausible interpretation for the blood composition of subject X.

(2 marks) b. Hemoglobin has a much greater affinity for carbon monoxide than for oxygen. If subject W were exposed to low levels of carbon monoxide for one month, what change would you expect to find in a blood sample taken at the end of this period? Explain your answer.

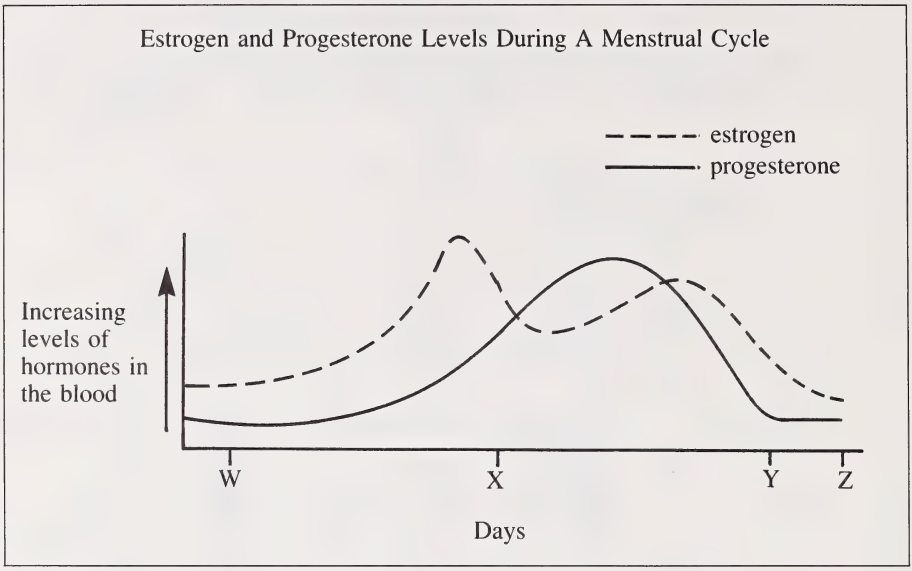
Use the following information to answer question 5.

Daily Water Loss in Humans		
Medium	Water Loss Without Exercise (mL)	Water Loss With Exercise (mL)
Water Vapor (from lungs)	350	850
Sweat	450	2900
Feces	200	200
Urine	1400	500
TOTAL	2400	4450

(2 marks) 5. a. In reference to the data, explain why there is increased water loss through the lungs and skin during prolonged exercise.

(1 mark) b. Indicate why daily urine output decreases during a period of heavy exercise.

Use the following information to answer question 6.



(1 mark) 6. a. By which day (W, X, Y or Z) would you expect to find a functioning corpus luteum?

_____

(1 mark) b. Explain your answer.

_____

_____

_____

_____

YOU HAVE NOW COMPLETED THE EXAMINATION. IF YOU HAVE TIME, YOU MAY WISH TO GO BACK AND CHECK YOUR ANSWERS.

TEAR-OUT SHEET

(NO MARKS WILL BE GIVEN FOR WORK DONE ON THIS PAGE)

FOLD AND TEAR ALONG PERFORATION

TEAR-OUT SHEET

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